

REMARKS

Claims 1-4 and 8-23 remain in this application. Applicant respectfully requests re-examination. A request for a one month extension is submitted herewith.

Claim 12 was rejected under 35 U.S.C. §112, second paragraph on the grounds that the limitation "the first rinsing" did not have antecedent basis.

Claim 11 has been amended to recite a "first rinsing" step. Applicant respectfully requests that this rejection be withdrawn.

Claims 1-2, 4, 8-10 and 22-23 were rejected under 35 U.S.C. §103(a) as unpatentable over *Raguin* (Patent Publication No. 2002/0182547) in view of *Kitano et al.* (Patent Publication No. 2002/0088393) and *Wilkinson* (US 4,422,904). Applicant respectfully traverses.

*Raguin* is directed to a method for fabricating a structure on a substrate by placing photoresist material on the substrate to a height greater than 15 microns. The *Raguin* substrate is a smooth wafer 39. The desired surface relief profiles which are the object of *Raguin*'s patent are built on this smooth substrate. *Raguin* teaches that the photoresist materials are coated onto the substrate by a well known spinning technique, as illustrated in his Figure 4. Figure 4 shows a photoresist blob of material 44 applied to the substrate 41 in the center by a piped or a spray. Once the photoresist is dispensed onto the substrate, the substrate is spun at a variety of revolutions per minute in order to spread the blob of photoresist material 44 out over the substrate 41 (paragraph 35).

*Raguin* also discusses applying the photoresist onto a substrate using a spray method as shown in his Figure 6(e). Figure 6(e) shows a substrate 621 on a conveyor belt or roller 622, for movement laterally. A spray nozzle 623 is mounted on an arm 625 that travels transversely to the movement of the substrate, in order to cover the entire surface of the substrate (paragraph

52). Neither the movement of the substrate in a straight line or the movement of the nozzle in a straight line changes speeds. Moreover, when using a spray application, *Raguin* teaches that the substrate is only moved laterally. It is not spun.

*Raguin* discusses applying a developer to the photoresist material by a variety of different methods as illustrated in his Figure 10. Figure 10(a) illustrates a puddle developer application method. Figure 10(b) illustrates a spray developer application method. Figure 10(c) illustrates a dip or immersion developer application method.

In the spray application method, *Raguin* teaches that the developer solution is deposited onto the substrate surface by a spray nozzle 107 at the center of the substrate while the substrate is spun, thus causing the developer solution to constantly be sheeted off the substrate while fresh developer is being sprayed on (paragraph 58).

*Kitano et al.* is directed to coating certain areas of a wafer with a photoresist fluid as shown in his Figure 6. Figure 6 shows moving the nozzle 6 (Figure 3) in an X direction, for example, to dispense the photoresist liquid 60 onto the wafer in parallel lines (paragraph 88). *Kitano et al.* teaches that the nozzle speed is preferably constant. However, the scanning speed of the nozzle can be varied, if a variable film thickness is desired.

*Kitano et al.* contemplates that either the nozzle or the wafer may be moved. *Kitano et al.* contemplates that the wafer may be moved by a belt drive mechanism (paragraph 170), much like the one shown in *Raguin* (paragraph 170).

*Wilkinson* is directed to a method of forming video disks. One part of that method is applying a photoresist coating to a glass substrate having a smooth planar surface. *Wilkinson* contemplates applying the photoresist coating to the glass substrate by depositing photoresist solution onto the surface of the substrate as it is rotated at a high velocity, causing the substrate

solution to spread across the entire surface of the substrate (column 3, lines 60-68, column 4, lines 1-7). This process could be the puddle or the spray process described in *Raguin*.

None of the references of record address the problem of coating a substrate with a photoresist material wherein the substrate has a plurality of varying deep trench features which need to be evenly coated as does the present invention. None of the references of record describe a method by which that can be accomplished.

None of the references of record show, describe or contemplate "rotating a substrate having a perimeter and a center at a constant predetermined speed; spraying the mixed solvent based resist through a spray nozzle onto a surface of the substrate at a spray angle to the surface of less than 90 degrees, while moving the spray nozzle diametrically across the surface of the substrate from the perimeter to the center at a speed that increases as the nozzle moves toward the center, and decreases as it moves toward the perimeter, thereby coating the deep features of the substrate with a photoresist coat of substantially uniform thickness," as recited in claim 1.

Claims 2, 4 and 8-10 depend from and further limit claim 1.

Claim 22 recites "rotating the substrate at a constant predefined speed; spraying a mixed solvent based resist through a spray nozzle onto the primed surface of the substrate at a spray angle to the primed surface of less than 90 degrees, the mixed solvent based resist having a viscosity between about one and about three centipoises while moving the spray nozzle diametrically across the substrate surface from the perimeter to the center at a speed that increases as the nozzle moves toward the center and decreases as it moves toward the perimeter, thereby coating the deep features in the substrate with a photoresist coat of substantially uniform thickness."

Claim 23 depends from and further limits claim 22.

Applicant respectfully requests that this rejection be withdrawn.

Claim 3 was rejected under 35 U.S.C. §103 as unpatentable over *Raguin* in view of *Kitano et al.* and *Wilkinson*, and further in view of *Deutsch et al.* (US 3,637,384). Applicant submits hereat the arguments set forth above in support of the patentability of claim 1. *Deutsch et al.* does not fill the void of the prior art noted above.

Applicant respectfully requests that this rejection be withdrawn.

Claims 11 and 13-15 were rejected under 35 U.S.C. §103(a) as unpatentable over *Raguin* in view of RD91 (Kenneth Mason Publications, vol. 324, April 1991). Applicant respectfully traverses.

Applicant submits hereat the arguments set forth above in support of the patentability of claim 1. The RD91 reference does not fill the void in the art noted above.

Applicant respectfully requests that this rejection be withdrawn.

Claim 12 was rejected under 35 U.S.C. §103(a) as unpatentable over *Raguin* in view of RD91 and *Sakai et al.* (US 4,791,465). Applicant respectfully traverses.

Applicant submits hereat the arguments set forth above in support of the patentability of claim 1. *Sakai et al.* does not address, and cannot fill the void in the art noted above.

Applicant respectfully requests that this rejection be withdrawn.

Claim 16 was rejected under 35 U.S.C. §103(a) as unpatentable over *Raguin* in view of RD91 and *Deutsch et al.* (US 3,637,384). Applicant respectfully traverses.

Applicant submits hereat the arguments set forth above in support of the patentability of claim 1. *Deutsch et al.* does not and cannot fill the void in the art noted above.

Applicant respectfully requests that this rejection be withdrawn.

Claims 17-18 were rejected under 35 U.S.C. §103(a) as unpatentable over *Raguin* in view of RD91 and *Kitano et al.* Applicant respectfully traverses.

Applicant submits hereat the arguments set forth above in support of the patentability of claim 1. RD 91 cannot fill the void in the art noted above.

Applicant respectfully request that this rejection be withdrawn.

Claims 19-21 were rejected under 35 U.S.C. §103(a) as unpatentable over *Raguin* in view of *Kitano et al.*, *Wilkinson* and *Dammel et al.* (Patent Publication No. 2004/0185368). Applicant respectfully traverses.

Applicant submits hereat the arguments set forth above in support of the patentability of claim 1. *Dammel et al.* cannot fill the void in the art noted above.

Applicant respectfully requests that this rejection be withdrawn.

In light of the above amendment and remarks, applicant respectfully submits that all the claims remaining in this application are patentable over the art of record and requests that they be allowed and this application passed to issue.

Very truly yours,

**SNELL & WILMER L.L.P.**



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